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ABSTRACT

This paper presents the Virtual Reference Desk project, its current activities, and a proposed information system architecture to build a human intermediated network of expertise and experience for the K-12 community. The Virtual Reference Desk is a project headed by the ERIC Clearinghouse on Information & Technology and funded by the U.S. Department of Education's National Library of Education and receives support from the White House's Office of Science and Technology Policy. It seeks to study, support and improve current K-12 digital reference services, so called AskA services, as well as build a foundation for a national cooperative digital reference service. The paper demonstrates the viability of implementing a large-scale information system that directly utilizes human expertise. A preliminary technical architecture is outlined that consists of a meta-triage function to connect digital reference services, and a "shrink-wrapped" software package to help build and maintain new digital reference services. (Contains 18 references.) (Author)

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The Virtual Reference Desk: Building a Network of Expertise for America's Schools

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WHITE PAPER

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Abstract

This paper presents the Virtual Reference Desk project, its current activities, and a proposed information system architecture to build a human intermediated network of expertise and experience for the K-12 community. The Virtual Reference Desk is a project headed by the ERIC Clearinghouse on Information & Technology and funded by the U.S. Department of Education's National Library of Education and receives support from the White House's Office of Science and Technology Policy. It seeks to study, support and improve current K-12 digital reference services, so called AskA services, as well as build a foundation for a national cooperative digital reference service. The paper demonstrates the viability of implementing a large-scale information system that directly utilizes human expertise. A preliminary technical architecture is outlined that consists of a meta-triage function to connect digital reference services, and a "shrink-wrapped" software package to help build and maintain new digital reference services.

THE OPPORTUNITY

The Internet provides this country with an opportunity to improve how we educate our children. The "killer application" for education, however, is not in more web pages, streaming video or animations over a modem. Instead the true power of the Internet to revolutionize education is bringing experts and expertise to the classroom, and making it as easy to talk with an author as it is to read a book. The opportunity for communication between those who know and those who want to learn is incredible. NetDay has made it possible for millions of the K-12 community to connect to the Internet. The Virtual Reference Desk creates an opportunity for millions of K-12 community members to ask questions and millions of experts to answer those questions, not in a single day, but in an ongoing volunteer effort. In this way, K-12 education becomes a process of communication and learning becomes the purview of everyone.

HUMAN EXPERTISE IN INFORMATION SYSTEMS

In reviewing literature concerning "digital libraries[1]," or "libraries of the future (Crawford and Gorman, 1995)," two viewpoints become obvious. One view sees the library as an information system with little or no human component. Such a view is characterized by such quotes as:

> "...the library might be seen as a machine with many simultaneous users, each of whom perceive that he has the whole collection to himself, and further, through connections to other libraries...access to much greater resources than are physically present." (Hartly cited by Von Wahlde and Schiller 1993, 15)

> "...The electronic library will be realized as an aggregation of catalogs, lists, and indexes of documents of every imaginable type, organized according to myriad schemes of classification, and linked and cross-indexed for search, so that they come to behave as a single database in which the lines between individual collections and catalogs are blurred." (Nunberg 1993, 30)

[1] For more information on the Digital Libraries Program see the D-*lib* site (http://www.dlib.org/)

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In these quotes, the information system is seen as collections and interfaces, but whose human component has been minimized, or completely eliminated. The information system (here a library) is a set of "indexes," "databases," and "schemes" that can be accessed "as a machine." The second view sees a vital human component in the digital library information system:

> "'Library' as a place, will give way to 'library' as a transparent knowledge network providing 'intelligent' services to business and education through specialized librarians and merging information technologies." (Murr and Williams 1987, 7)

> "The virtual library is the 'library without walls,' but with instantaneous electronic connections to libraries, individuals, institutions, and commercial firms worldwide. It is access to a reservoir of intellectual resources encompassing not only formal libraries, but also databases, electronic texts, multimedia objects, and potentially millions of interacting human minds." (Beiser 1992, 26)

The Virtual Reference Desk is a project founded on this second view where the future information system is a "knowledge network" with "intellectual resources" consisting of "millions of interacting human minds." The project seeks to identify current schemes that utilize human intermediation, and then develop means of scaling these systems to serve larger communities. In essence, the Virtual Reference Desk is exploring mechanisms to incorporate human expertise through intermediation in large-scale information systems. This is a very different approach to traditional expert system approaches that seek to capture human knowledge and procedures and encode them into an automated system.

NETDAY...WHAT'S NEXT

On March 28, 1998 thousands of parents, teachers, students, and other volunteers will spend their weekend pulling wire through the nation's schools. For many of the nation's K-12 schools NetDay (NetDay 1998) is the first step towards connecting to the Internet. In still others this will be an expansion of existing Internet connections. While connectivity is the vital first step in incorporating the Internet into the classroom, it begs the equally important question: to what are we connecting these classrooms?

While there is little doubt that the Internet allows access to an enormous amount of information useful to K-12 education (videos, current events, access to scientific simulations) many have questioned the usefulness of this raw information to a student (Oppenheimer, 1997). Just as a school is more than a building filled with information (it incorporates teaching and curriculum) the Internet in the classroom needs to be more than a network full of raw data. It needs human experts and experience to provide context and guidance to the K-12 community.

The Virtual Reference Desk proposes to build an infrastructure that uses the Internet to link the K-12 community with experts and experience: an infrastructure that can link a fourth grade science student to a physicist or volcanologist. This infrastructure will allow all qualified volunteers to answer the questions of students, educators and parents and guide them to information that can improve teaching and learning. This link does not occur on a single day during the year, but every day. The Virtual Reference Desk will coordinate an ongoing volunteer effort that provides the expertise, context and guidance needed by the K-12 community to make Internet connectivity in the classroom a success.

The scale of the above task becomes clear when one considers that by the year 2007 there will be an estimated 54 million K-12 students (Department of Education, 1996). This figure does not include teachers, parents, administrators, board members and other members of the K-12 community. With universal connectivity to the Internet quickly becoming a reality through private, government and school-based initiatives the potential burden on K-12 Internet services is daunting. This is especially true with so-called AskA services[2] that provide the K-12 community with access to human expertise and experience (Lankes,

[2] AskA services, also known as digital reference services, provide human expertise through question answer services on the Internet. So called for services such as Ask-A-Scientist or Ask-A-Volcanologist, these services take questions through e-mail and the World Wide Web.

1997) - a vital commodity in the wilds of the Internet. Many existing services have already experienced tremendous growth in questions (Lankes, Bry & Whitehead, 1996).

CURRENT VIRTUAL REFERENCE DESK ACTIVITIES

Every week thousands of students, teachers, librarians, parents, and other members of the education community receive answers to their questions through the Internet. Dinosaur facts, math calculations, staff development activities and more stream through the wires, fibers and computers that make up the global network. No longer are members of the education community restricted to artifacts of knowledge[3] (books, magazines, etc.) in finding their answer; they now have access to the knowledge itself in the form of experts. AskA services such as AskERIC (Lankes, 1995), the MAD Scientist Network (MAD Scientist Network, 1996) and the Internet Public Library (Internet Public Library, 1998) have demonstrated the power of putting people directly in touch with those who can answer their questions.

The Virtual Reference Desk project headed by the ERIC Clearinghouse on Information & Technology and the National Library of Education has embarked on improving the way the K-12 community gets answers from the Internet. This one-year study is providing the needed tools and information to improve how AskA services respond to the questions of the K-12 community. Table 1 outlines the current work of the Virtual Reference Desk.

Table 1: Current Virtual Reference Activities

Task	Description
Forum for Discussion	The Virtual Reference Desk brings together AskA services, the information community, organizations and government in a common discussion of digital reference services and providing expertise electronically to the K-12 community. This is done by building Internet services (such as a web site and electronic discussions), presentations and briefings. The Virtual Reference Desk seeks to expand its role as a clearinghouse for information related to digital reference services.
Prototype Knowledge Base	The Virtual Reference Desk Project is working with the University of Michigan and the Internet Public Library to create a distributed index of question and answer archives. The prototype Knowledge Base will utilize the archives of reference transactions that AskA services make available on the web. The Knowledge Base will build a unified interface to these distributed resources (see "Knowledge Base" description below). Such a resource will allow AskA services to better answer out-of-scope questions as well as provide end-users a single point of entry into these resources.
Locator	The Virtual Reference Desk project, with the aid of an expert panel of digital reference experts[4], identified over 70 AskA services that serve the K-12 community and meet some minimal quality criteria also developed by the expert panel (see Appendix B). A searchable database of these services was created utilizing the GEM standard (Sutton & Oh, 1997). This Locator database allows end-users to identify AskA services, and the Virtual Reference Desk project to identify gaps[5] in the existing online expertise.

[3] For a thorough review of artifacts of information see Buckland's (1991, 43-54) discussion on "Information-as-Thing."
[4] For a complete membership list of the expert panel see http://www.vrd.org/panel/members.html.
[5] Gaps are operationalized as subject areas covered in a basic K-12 curriculum, but that do not have any direct AskA service on the Internet. For example, there is no large-scale chemistry AskA service.

Task	Description
AskA Research	An extensive qualitative study resulted in building empirical descriptions of exemplary AskA services. These descriptions formed the baseline data of present AskA service practices as well as the technology architecture discussed in this paper (for more information on the study see Lankes, 1997).
Resource Development	A main effort of the first year of the Virtual Reference Desk has been the creation of materials and resources for the AskA community and organizations seeking to create digital reference services. These include a digital reference listserv with nearly 1,600 subscribers (DIG_REF, 1998) and training materials (Kasowitz, 1997). A "starter kit" for organizations seeking to create AskA services is underway[6].

These activities are expected to continue and expand into the implementation phase. The Virtual Reference Desk seeks to provide services both on the "back-end" to AskA services and organizations through its present activities as well as provide "front-end" services to the K-12 community through the Meta-Triage process describe later in this paper.

A Consortium of AskA Services

In addition to the activities listed in Table 1, the Virtual Reference Desk is coordinating an AskA Consortium. This consortium was developed in response to the Internet model of collaboration and cooperation. Building the Virtual Reference Desk as a single site, or within a single service would be difficult, counterproductive, and would overlook the incredible work already being done by existing Internet services such as the Internet Public Library, AskERIC and the MAD Scientist Network, just to mention a few. For this reason, the project is helping to form an AskA consortium. This consortium will serve two major functions:

1. It will be a cooperative network that seeks to provide resources (computing infrastructure, funding, and knowledge) to its members. Working together AskA services present a far more attractive force to associations and organizations than working separately. Further, by participating in the Virtual Reference Desk, AskA services can gain access to content experts, questions and organizations and associations seeking to support their valuable work.

2. It will be a guiding body for the Virtual Reference Desk. There is a lot of work to be done, and many issues to be worked out in forming and maintaining a high-quality national reference service for the K-12 community. AskA consortium members will be at the front of that debate. Setting policy and guiding the Virtual Reference Desk in this manner will make the project an open and truly cooperative system.

Current members of the AskA consortium include AskERIC, the Internet Public Library and the MAD Scientist Network.

A PROPOSED VIRTUAL REFERENCE DESK ARCHITECTURE

Based on the current research being conducted a preliminary technical architecture has been proposed to implement the Virtual Reference Desk as a national cooperative digital reference service. This technical architecture is broken into two major sections: *Meta-Triage* and *AskA software*. The *Meta-Triage* function is the backbone infrastructure that connects AskA services and end-users together. The AskA software is a "shrink-wrapped" set of applications that are installed and managed by individual AskA services. The

[6] Current completion date for the starter kit is May 1998, and should be available from the ERIC Clearinghouse on Information & Technology (http://ericir.syr.edu/ithome/).

AskA software is considered a lightweight version of the *Meta-Triage* function, so it is presented last and in less detail. Each of the major sections is further broken down into constituent components.

META-TRIAGE FUNCTION

The *Meta-Triage* function links all the triage functions of the AskA services. It acts as the central switchboard for questions and answers traversing the Virtual Reference Desk's network of users and knowledge resources. It is anticipated that this function will need to handle millions of questions per day. This central switch serves four basic functions:

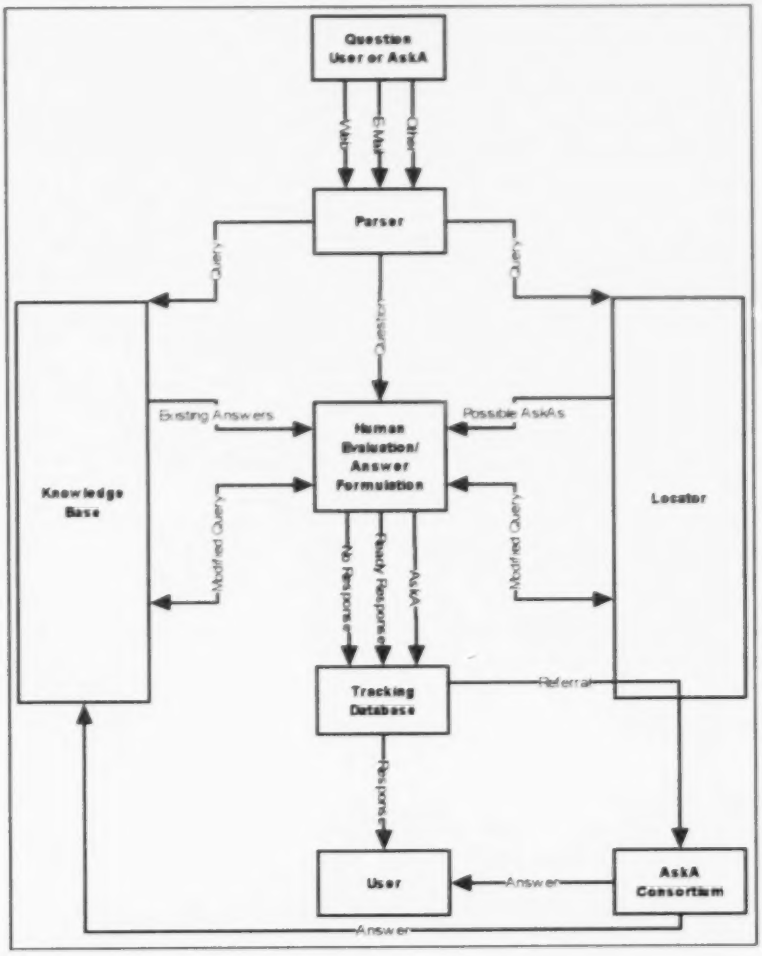
1. Identify the Most Appropriate Knowledge Resource for a Question: Knowledge resources are sources of answers. In the Virtual Reference Desk there are two primary knowledge resources: human experts organized by AskA services and the Knowledge Base which is an archive of existing question/answer sets.

2. Balance the Load of AskA Services: The Meta-Triage function takes questions from the K-12 community directly as well as from the AskA services. In this way if an AskA service receives too many questions, overload questions can be routed to other AskA services that are under-utilized.

3. Balance the Scope of AskA Services: An AskA service can also send questions to the Meta-Triage function if they do not match the expertise provided by that AskA service. In this way if an AskA service receives a question from a user and is unable to answer it (a science question sent to a math service for example) it can use the Meta-Triage to get the user's question to the best knowledge resource.

4. Track Trends in Questions: A tracking database identifies hot topics and trends in how questions are asked and answered. This data can be utilized by organizations to identify new resource possibilities and allocate existing resources.

The Meta-Triage consists of several functions (detailed on the following pages) that allow maximum efficiency in answering questions while ensuring a human touch, quality and the maximum creativity and efficency on the part of participating AskA services. The overall Meta-Triage process is detailed in figure 1.



Parser

Upon receiving a question the text of the message is parsed for identification of key components (subject, user's role in the K-12 community [teacher, student, etc], grade level, etc). These components form a query that is associated with the original question, which is always preserved. The query will then be run through the *Knowledge Base* and the *Locator* before being presented to a human evaluator for final action (such as creating an answer or being forwarded to an AskA service).

Two main interfaces are anticipated for receiving questions: e-mail and a web form. However, other interfaces may be added later (such as tie-ins from educational software, services and future Internet protocols). In any case, the parser will need to take natural language input (free text from the question) and translate it into a query string understood by both the *Knowledge Base* and *Locator* components outlined below. This might involve a simple keyword parsing, or more sophisticated natural language techniques (including morphological or discourse analysis).

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Knowledge Base

The *Knowledge Base* represents a structured collection of existing question/answer sets. It is distributed with its contents managed by the varying AskA services. The *Knowledge Base* consists of several sub-functions:

- Query Interface (Human and Automated): The Knowledge Base can either be searched directly by a user, or used as an intermediate step for an AskA service (sending a user through the Knowledge Base or some sub-set of the Knowledge Base before forwarding a question onto a human intermediary).

- Hierarchical Subject Structure: The information in the Knowledge Base is organized into collections (question/answer sets from an individual AskA service). These collections are then cataloged in a lightweight subject hierarchy[7] (based on the GEM[8] subject hierarchy) that allows users or AskA services to search on sub-sections of the Knowledge Base.

- Distributed Indexing/Spidering Component: The AskA service that creates a collection maintains that collection in the Knowledge Base. Collection holders can add/delete/correct information within their collections without going through the Virtual Reference Desk. This ensures the most up to date and accurate Knowledge Base. Because the question/answer set collections reside on the AskA service site, the Knowledge Base must be able to build indexes through remote spidering.

- Mirroring/Archiving Component: Some sites will not have the technical infrastructure to maintain their own collections or to ensure their availability. The Virtual Reference Desk Knowledge Base will need to create mirrors of these sites or provide tools and storage for these collections to be built within the Virtual Reference Desk.

The *Knowledge Base* will be used in multiple ways including: by AskA services to support their regular question answering; as an interface to a question answer process; or directly by the user. Therefore it must be built with an open interface (supporting queries through CGI, SQL, ODBC and other standards). It must be directly accessible by the user, the *Meta-Triage* process and the triage processes of the individual AskA services.

Locator

The *Locator* is the central information source on AskA services and human knowledge resources. Each AskA service has a profile in the *Locator* that identifies:

- Service Description: an abstract of the service that allows a human evaluator (or user) to determine the appropriateness of the service.

- Subject Expertise: a Locator profile uses GEM subject headings and keywords to identify the topicality of a given AskA service.

- Location And Interfaces: URLs and protocols used to send a question to an AskA service.

- Answer Ability: statement of load in terms of number of questions that can be answered at a given point. It is hoped this number will be dynamic as the network develops.

- Contacts: key individuals within a service that make policy and can handle any problems that may arise.

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[7] While the collections are controlled and housed by AskA services, the subject hierarchy is controlled by the Virtual Reference Desk.
[8] GEM (http://www.geminfo.org) is a meta-data project creating vocabularies and standards for finding educational material on the Internet.

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- Relations: relationships between an AskA service and other organizations.

- Audience Served: types of users the AskA serves (educators, parents, students).

When a question first arrives in the *Meta-Triage*, the parser creates a query. This query is run against the *Knowledge Base* (above) and the *Locator*. The *Locator* is used to create a list of potential human knowledge resources that can be used to answer the question. However, users can also use the *Locator* to identify an appropriate AskA service on their own.

Human Evaluation/Answer Formulation

The key to the Virtual Reference Desk is human intermediation. The *Knowledge Base*, the *Locator*, and the *Parser* are means of improving the efficiency and effectiveness of the human intermediary. The *Human Evaluation/Answer Formulation* component is the distributed interface that allows information professionals to examine incoming questions, the results of the automated "best guesses" and settle on a final course of action. This component consists of:

- Question Distribution: questions, their related queries and results from automated pre-processing are put in a queue. Information professionals call up this data from the queue (using a simple "first in, first out" algorithm) and evaluate the results of the automated work.

- Three-Pane Interface: the human intermediary works with the incoming question in three panes - the original question, the results from the Knowledge Base and the results from the Locator. They can use this interface to continue to refine searches in the Knowledge Base and Locator.

- Question Assignment: after evaluating the question and any needed refined searching the human intermediary can:
  - determine the question does not need a response (due to inappropriate content or the fact that it was not actually a question),
  - accept an answer from the Knowledge Base or create a new answer from several answers in the Knowledge Base, or
  - forward the question on to a member of the AskA Consortium based on both the scope of an AskA service and the present question load of that service (both determined from the Locator).

While it has not been finalized, it is assumed the human intermediation discussed above will be conducted by hundreds of volunteer information professionals (mainly from the library community). They will be geographically distributed and utilize a wide range of technologies to interface with the system. The interface will be made available to all qualified volunteers. AskA services can aid in the human evaluation, as can librarians and library organizations as part of training and organizational development. While the Virtual Reference Desk will provide the infrastructure and training for these evaluators, they will not be part of the Virtual Reference Desk itself.

Tracking and Trend Identification

Once the human intermediary has assigned a course of action for a given question, a tracking database both fulfills the assigned action as well as records information for later analysis. This information consists minimally of:

- Number of Questions Processed and By Whom: this raw number shows general usage of the service as well as the contribution of those doing the human evaluation.

- Repeat Topics: subjects are recorded to determine "hot topics."

- Success of Automated Searches: original queries created by the Parser can be compared with the final "modified queries" created by the human intermediaries to weight terms in the Parser and improve overall automated performance.

- Distribution of AskA Questions: tracks how many questions were sent to AskA services and adjusts the current capacity of those AskA services in the Locator for the next question (shown in figure 1 as the "referral" intersecting the Locator).

- Use of Knowledge Base Questions and Collections: tracks how the Knowledge Base is being used and helps weight the use of the collections in automated queries.

- Demographics of Users: tracks users who are using the system.

This tracking database is the feedback loop that helps to fine-tune the Parser and Knowledge Base while keeping the Locator up to date.

AskA Consortium in the Meta-Triage

It was mentioned above there are two basic knowledge resources in the Virtual Reference Desk infrastructure: the *Knowledge Base* was previously discussed; the other is human expertise. Human experts are organized into AskA services. These services are organized primarily by subject while some offer other expertise such as library media skills in KidsConnect[9]. AskA services are responsible for keeping their *Locator* profiles current, accepting questions from the *Meta-Triage* function and contributing to the *Knowledge Base*. AskA services will also serve to assure quality in the system.

AskA SOFTWARE

In addition to building the *Meta-Triage* function the Virtual Reference Desk will write and distribute software to present and new AskA services to improve K-12 digital reference and fill gaps in existing AskA services. This software needs to be cross-platform and easy to install. This "shrink wrapped" software needs to allow organizations to create autonomous triage systems that can interface with the Virtual Reference Desk. This software mirrors the construction of the *Meta-Triage* architecture:

- Parser: None of the current AskA services examined by the Virtual Reference Desk incorporates automated pre-processing. It is hoped that by building a lightweight Parser these services can increase capacity of questions answered.

- Knowledge Base: All of the current AskA services examined incorporate some sort of archive to help answer questions. However, there is no standard way of building (or sharing) these FAQ's and archives. Further, the present state of technology used to build these systems varies widely (many are simply web pages in classified directories). A common knowledge base component would ease integration into the larger Knowledge Base and improve efficiency in answering questions.

- Human Evaluation: As with the Meta-Triage system, the core value added by these AskA services is the human expertise and evaluation. Therefore an efficient interface to allow the evaluation and distribution of questions is needed. However, instead of routing to other AskA services, this evaluation system will need to route to individual experts within an AskA service.

[9] KidsConnect (http://www.ala.org/ICONN/kidsconn.html) is a project of the American Association of School Librarians.

- Tracking Database: Tracking and resource allocation is essential if these services are to grow and handle the potential overwhelming volume of questions from a fully connected K-12 community.

- Ties to Locator: The shrink-wrapped package should allow for dynamic updating of the Virtual Reference Desk Locator. This software can show how many questions an AskA service can handle at any given point in time.

These components need to be flexible, allowing AskA services to incorporate them in parts or whole. Further, these modules need to allow maximum flexibility to allow services to customize their operations based on the unique talents of their organizations. It is hoped, however, that by building the larger Meta-Triage system, creating the "shrink-wrapped" AskA software package will be a process of making the logic and code smaller and more transferable.

As with the overall Knowledge Base it is anticipated that there will be organizations with insufficient technical infrastructure to implement all of these components. In such cases the Virtual Reference Desk will need to implement the software on behalf of these cooperating services.

It is also anticipated that the Virtual Reference Desk will constantly be implementing software to improve digital reference either as a research & development effort, or to provide to organizations with insufficient technology infrastructure. As an example, the Virtual Reference Desk may set up a real-time conferencing system to allow real-time consultations between a K-12 community member and an expert. Any AskA service could use this system though it would be built and maintained by the Virtual Reference Desk.

THE VIRTUAL REFERENCE DESK PHASE 2

Once the technical architecture described above is put into place the Virtual Reference Desk will have two primary functions: answering questions, and organizing new AskA services. These functions are delineated in Table 2 below on the anticipated functions of the Virtual Reference Desk.

Table 2: Anticipated Functions of the Virtual Reference Desk

Primary Function	Component Function	Description
Answering	Meta-Triage	The Virtual Reference Desk will maintain the Meta-Triage function as described above. This is a distributed, volunteer-driven switchboard that takes questions from the K-12 Community and links them with the appropriate knowledge resource to provide an answer. It includes links to both the Knowledge Base and Locator.
	Locator	The Virtual Reference Desk will maintain and continue to populate the Locator as described above. It is a central source of information on AskA services to be used directly by the K-12 community or as part of the larger Meta-Triage function. This includes GEM cataloging sites.
	Knowledge Base	The Virtual Reference Desk will maintain the basic Knowledge Base software as described above. It will remain a distributed interface to existing question/answer sets that provides AskA services with control over their content, while utilizing a subject hierarchy to aid in information retrieval.

Primary Function	Component Function	Description
Organizing	Resources	The project will create resources (manuals, web sites, listservs, CD-ROMS) that assist organizations in building and maintaining AskA services as well as demonstrating means to improve effectiveness and efficiency in existing AskA services.
	Research	The project will continue to investigate in a practical and applied manner the field of digital reference and its impacts on the K-12 community
	Software Development	The Virtual Reference Desk will coordinate software development among its partners to constantly provide AskA services with the latest in technology resources. This includes creating specifications for new software, implementing existing Internet software, and modifying software for digital reference.
	Match Making	In an attempt to scale up digital reference on the Internet volunteers will be matched to AskA services and AskA services will be matched to supporting organizations. The Virtual Reference Desk will act as an initial point of contact between these groups.
	Incubating	Software and training will be provided to organizations just beginning AskA services. It is anticipated that these services will become independent AskAs after an initial "ramping-up" period.
	Training	The Virtual Reference Desk will provide training services and materials to organizations and volunteers. The project team will be available to consult with organizations to create specialized training plans.
	Consortium Building	The Virtual Reference Desk will continue to act as the administrative body for the AskA Consortium; convening meetings and enacting the recommendations of the Consortium.

CONCLUSION

The vision of the Virtual Reference Desk is an exceptional educational resource: a resource that is a cooperative of all those interested in improving education including schools, colleges, industry, government, and any qualified expert. By linking the K-12 community directly with expertise and primary source information, the nation can facilitate and enhance learning. Students can learn not only from books, but from authors. Teachers can tap not only into developing news, but news makers. Today's connected K-12 education creates an amazing opportunity for first hand knowledge. The Virtual Reference Desk is helping to build such a network of experience and inquiry.

The ultimate goal of the Virtual Reference Desk project is to allow every qualified person interested in volunteering their time to answer the questions of the K12 community to do so. The project builds on national initiatives of the President including a call for increased volunteerism through mentoring, and

meeting the President's education initiatives, specifically in "Consider[ing] a broad range of educational resources, including...employees willing to serve as tele-mentor or answer student and teacher questions."

The Virtual Reference Desk will provide the required infrastructure for digital reference services, as well as a rich knowledge base of student and teacher questions for identifying trends and service needs in the K-12 community. It will also link the federal initiatives with those of not-for-profit associations, for-profit educational offerings, and ongoing digital reference activities.

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Appendix A: About the Current Virtual Reference Desk Project

Every week thousands of students, teachers, librarians, parents and other members of the education community receive answers to their questions through the Internet. Dinosaur facts, math formulae, staff development ideas and more stream through the wires, fibers and computers that make up the global network. No longer are members of the education community restricted to artifacts of knowledge (books, magazines, etc.) to find answers; they now have access to the knowledge itself in the form of experts. AskA services such as AskERIC, the MAD Scientist Network and the Internet Public Library have demonstrated the power of putting people directly in touch with those who can answer these questions.

The Virtual Reference Desk project headed by the ERIC Clearinghouse on Information & Technology (ERIC IT) and the National Library of Education (NLE) has embarked on improving the way the K-12 community gets its information from the Internet. A one-year study has provided the needed tools and research to improve how AskA services respond to the questions of the K-12 community. Research has resulted in a set of tools (software, documents, etc.) that these services can use. AskA services, telementors and users alike can utilize the resources of the Virtual Reference Desk. AskA services can download custom software and help manuals to implement in their services. Scholars and practitioners can review case studies of exemplary digital reference services. Users can use a locator service to find high-quality AskA services they can interact with directly.

It is hoped that this initial project will provide a foundation for a larger cooperative national digital reference service for the K-12 community. The ERIC IT Clearinghouse is working with the National Library of Education and the White House to plan an expanded Virtual Reference Desk. Such a service would link those with questions to those with answers developing a network of the various AskA services. This service would continue to act as a clearinghouse for resources, knowledge and funds for existing AskA services as well as working with associations and organizations to create new digital reference services.

The vision of the Virtual Reference Desk is as an exceptional educational resource: a cooperative of all those dedicated to improving education including schools, colleges, industry, government, and qualified experts. By linking the K-12 community directly with expertise and primary source information, the nation can improve education. Students can learn not only from books, but from authors. Teachers can tap not only into developing news, but newsmakers.

Today's connected K-12 education creates an amazing opportunity for first hand knowledge. The Virtual Reference Desk is helping to build such a network of experience and inquiry.